Subject File: 263
ULC-G5.2

Republished January 04, 2010

CAN/ULC-S101-04

CERTIFICATION BULLETIN 2009-31

To: Subscribers to UL's Classification Service for cUL Certifications to Standard CAN/ULC S101

Subscribers to ULC's Classification Service for ULC Certifications to Standard CAN/ULC S101

Members of UL's Fire Council and ULC's Advisory Council and Other Interested Parties

Subject: Revisions to Standard CAN/ULC S101 Sample Loading Requirements

This Bulletin is being republished in continuation to one issued back on Jun 14, 2006 that addresses a revision to Standard CAN/ULC S101, *Standard Methods of Fire Endurance Tests of Building Construction and Materials* and its impact on fire endurance ratings. All cUL and ULC certifications for fire resistive assemblies are based upon the requirements of CAN/ULC S101.

This bulletin was originally issued under the signature of the Team from both Underwriters Laboratories Inc & Underwriters Laboratories of Canada and is now being republished.

Should you have any questions or comments pertaining to cUL Certifications, please contact Luke Woods (email -Luke.Woods@us.ul.com) in lieu of Robert Berhinig and for ULC Certifications Abbas Nanji (email - abbas.g.nanji@ca.ul.com).

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June 14, 2006

CERTIFICATION BULLETIN

To: Subscribers to UL's Classification Service for cUL Certifications to Standard CAN/ULC S101

Subscribers to ULC's Classification Service for ULC Certifications to Standard CAN/ULC S101

Members of UL's Fire Council and ULC's Advisory Council and Other Interested Parties

Subject: Revisions to Standard CAN/ULC S101 Sample Loading Requirements

This Bulletin addresses a revision to Standard CAN/ULC S101, *Standard Methods of Fire Endurance Tests of Building Construction and Materials* and its impact on fire endurance ratings. All cUL and ULC certifications for fire resistive assemblies are based upon the requirements of CAN/ULC S101.

The third edition of CAN/ULC S101 was published in April 2004 as CAN/ULC-S101-04. CAN/ULC-S101-04 now requires the load applied on test samples be calculated using a limit states design method. All cUL and most ULC Certifications for fire resistive ratings are based upon data from tests for which the applied load was calculated using the working stress design method. Typically, superimposed loads calculated using the limit states design method are greater than the superimposed loads calculated using the working stress design method. Therefore, rated assemblies based upon tests for which the assembly was loaded using the working stress design method must be identified as "Load Restricted" as required by Sections 6.2.3, 8.2.3, 10.4.3 and 11.3.3 of CAN/ULC S101-04.

Details regarding this restricted load use condition have been added to the Guide Information Pages BXUVC, *Fire Resistance Ratings* in the ULC Directory – Fire Resistance and BXUV7, *Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada* in the cUL Directory. The revision to Guide Information Page BXUVC is provided in Attachment A. The updated text of Guide Information Page BXUV7 is provided in Attachment B.

The revision to CAN/ULC S101 applies to all ULC and cUL Certifications except ratings for:

1. Non-loadbearing walls and partitions, and

2. Steel Columns

The revision to the loading method does not apply to ratings for non-loadbearing walls and partitions and to ratings for steel columns because all the ratings on these assemblies are determined from tests on unloaded specimens as described in Sections 7 and 9 of CAN/ULC S101-04, respectively.

For load bearing members, CAN/ULC S101-04 requires the test specimen to be subjected to the specified gravity loads that produce a factored load effect as close as practicable to the factored resistance of the test specimen in order to satisfy the specified full load condition. The factored load effect and the factored resistance of the test specimen shall be determined in accordance with the appropriate limit states design method specified in the National Building Code of Canada. This is expressed as the "Load Restricted Factor."

Typically, the maximum live load determined using the limit states design method results in a higher permitted load as compared to using the working stress design method.

CAN/ULC S101-04 also permits fire endurance ratings to be based upon test samples that are loaded to less than maximum levels as determined by the limit states design method. CAN/ULC S101 states that when a test is conducted with a load condition that is less than the full specified load condition, the restricted load use condition shall be identified and reported.

To determine the magnitude of the restrictive load condition, loading was calculated for several typical test assemblies using the respective design methods. Based upon these calculations, the following restricted load conditions are being expressed as representative for ratings obtained from test samples loaded in accordance with the working stress design method.

Type of Assembly	Percent Load Reduction (LSD-WSD) / LSD	Load Restricted Factor
W8x28 – AISC (W200x42 – CISC) noncomposite steel beam	12%	0.88
W8x28 – AISC (W200x42 – CISC) composite steel beam	29%	0.71
Floor / Roof supported by open web steel joists	4%	0.96
Floor supported by cold formed steel channels	4%	0.96
Floor supported by 2 by 10 inch (38 by 235 mm) wood joists	35%	0.65
Wall supported by 2 by 4 (38 by 89 mm) wood studs	18%	0.82
Steel columns	0%	None

It is possible to have the restricted load use information that is applicable to a specific design included with the design's rating information. The structural analysis required to determine the specific impact of the revision to CAN/ULC-S101 would be untaken at the request of the fire test sponsor.

If it is desired to have UL/ULC staff review the impact of the requirement to have the load applied to fire test samples determined in accordance with the appropriate limit states design standard published by the Canadian Standards Association, please complete and return the Request for Load Restricted Ratings (Enclosed as Attachment C) together with calculations for the test assembly using both the working stress design method and the limit states design methods.

Should you have any questions or comments pertaining to cUL certifications, please contact Robert Berhinig

Should you have any questions or comments pertaining to ULC certifications, please contact Abbas Nanji.

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ATTACHMENT A

Revision to Guide Information Page BXUVC
Fire Resistance Ratings (BXUVC)
(Guide No. 40 U18)

RESTRICTED LOAD USE CONDITIONS

When a test assembly complies with the acceptance criteria, a detailed description of the assembly, its performance in the fire test and other pertinent details such as specifications of materials, Listing coverage and alternate assembly details are included in a report for the test sponsor. Sponsors may provide copies of the complete test report upon request. The report also contains a summary of important features of the rated assembly.

A complete description of each rated fire-resistive assembly can be found in the ULC Fire Resistance Directory.

Standard CAN/ULC S101 requires loads applied to test samples be calculated using the limit states design method specified in the National Building Code of Canada. The Standard also requires fire resistive assemblies with ratings obtained from samples tested with applied loads less than the maximum calculated value be identified. Load restriction due to the sponsor of the test electing to test the assembly under load less than specified by the limit states design methods are identified as “Load Restricted ...“. Assemblies evaluated with loading computed in accordance with working stress design methods are identified as “Load Restricted –Assembly evaluated in accordance with Working Stress methods, for use under Limit States Design methods refer to information under BXUVC.”

The percent load reductions for typical assemblies in Table 1 are based upon loading calculated in accordance with the working stress design method as compared to loading calculated in accordance with the limit states design method. The calculations were performed for assemblies representing spans and member sizes of typical fire test assemblies. The loads were calculated assuming a span of 4 meters for floors and roofs and 3 meters for walls.

The National Building Code of Canada requires that buildings and their structural components be designed to have sufficient strength and stability so that the factored resistance, φR, is greater than or equal to the effects of factored loads. The value for φ and R are specified in the applicable limit state design methods, for concrete, masonry, steel and timber.

Some fire resistive designs are specified with a Load Restricted Factor. When using fire resistive designs with a Load Restricted Factor, the factored resistance of the structural members or components, φR, should be reduced by multiplying the factored resistance, φR, by the Load Restricted Factor specified in the individual UL fire resistance designs.

The Load Restricted Factor shall be applied to the factored resistance of all structural members or components, φR, including but not limited to, factored moment resistance, (M_r), factored shear resistance (V_r), factored tensile resistance, (T_r), and factored compressive resistance, (C_r).

Table 1

Type of Assembly	Percent Load Reduction (LSD-WSD) / LSD	Load Restricted Factor
W200x42 Noncomposite steel beam	12%	0.88
W200x42 Composite steel beam	29%	0.71
Floor / Roof supported by open web steel joists	4%	0.96
Floor supported by cold formed steel channels	4%	0.96
Floor supported by 38 by 235 mm wood joists	35%	0.65
Wall supported by 38 by 89 mm wood studs	18%	0.82
Steel columns	0%	None

The ratings for steel columns do not have a “Load Restricted Factor” because these ratings are based on temperature limitations. No loading is applied to steel columns during the fire test.

The engineer of record shall be consulted whenever fire resistive assemblies with “Load Restricted Factors” are selected. The indicated load reductions are based upon Factored Load effects that are governed by the reduced Factored Resistance of the structural elements. The selection of structural elements is, at times, based upon service limits such.

As deflection and vibration. These factors and others, such as the change in material strength properties as a function of temperature, should be considered when selecting fire resistive assemblies with Load Restricted ratings.
The Load Restricted Factors in Table 1 are to be used as a guide and is applicable to the specific structural members specified in Table 1.

ATTACHMENT B

Guide Information Page BXUV7

Fire Resistance Ratings – CAN/ULC – S101 Certified for Canada

This category covers fire test method and acceptance criteria in CAN/ULC-S101, "Standard Methods of Fire Endurance Tests of Building Constructions and Materials." The ratings are expressed in hours and are applicable to floors, roofs, beams, columns and walls.

The specifications for the materials and construction of the fire-resistive assemblies are details that directly relate to the established ratings. The hourly ratings apply only to the entire assembly. Individual components are designated for use in a specific system to achieve specified ratings. The individual components are not assigned ratings and are not intended to be interchanged between systems.

When a test assembly complies with the acceptance criteria, a detailed description of the assembly, its performance in the fire test and other pertinent details such as specifications of materials, Classification coverage and alternate assembly details are included in a report for the test sponsor. Sponsors may provide copies of the complete test report upon request. The report also contains a summary of important features of the rated assembly.

A complete description of each rated fire-resistive assembly can be found in the UL Fire Resistance Directory.

Standard CAN/ULC S101 requires loads applied to test samples be calculated using the limit states design method specified in the National Building Code of Canada. The Standard also requires fire resistive assemblies with ratings obtained from samples tested with applied loads less than the maximum calculated value be identified as “Load Restricted”.

Assemblies tested with less than the maximum allowable load that would result from loading calculated using the limit states design method are identified as “Load Restricted”. The percent load reductions and the corresponding Load Restricted Factor for typical assemblies in Table 1 are based upon loading calculated in accordance with the working stress design method as compared to loading calculated in accordance with the limit states design method. The calculations were performed for assemblies representing spans and member sizes of typical fire test assemblies. The loads were calculated assuming a span of 4 meters for floors and roofs and 3 meters for walls.

The National Building Code of Canada requires that buildings and their structural components be designed to have sufficient strength and stability so that the factored resistance, φR, is greater than or equal to the effects of factored loads. The value for φ and R are specified in the applicable limit state design methods, for concrete, masonry, steel and timber.

Some fire resistive designs are specified with a Load Restricted Factor. When using fire resistive designs with a Load Restricted Factor, the factored resistance of the structural members or components, φR, should be reduced by multiplying the factored resistance, φR, by the Load Restricted Factor specified in the individual UL fire resistance designs.

The Load Restricted Factor shall be applied to the factored resistance of all structural members or components, φR, including but not limited to, factored moment resistance, (M_r), factored shear resistance (V_r), factored tensile resistance, (T_r), and factored compressive resistance, (C_r)

Table 1

Type of Assembly	Percent Load Reduction (LSD-WSD) / LSD	Load Restricted Factor
W8x28 – AISC (W200x42 – CISC) noncomposite steel beam	12%	0.88
W8x28 – AISC (W200x42 – CISC) composite steel beam	29%	0.71
Floor / Roof supported by open web steel joists	4%	0.96
Floor supported by cold formed steel channels	4%	0.96
Floor supported by 2 by 10 inch (38 by 235 mm) wood joists	35%	0.65
Wall supported by 2 by 4 inch (38 by 89 mm) wood studs	18%	0.82
Steel columns	0%	None

The ratings for steel columns do not have a “Load Restricted Factor” because these ratings are based on temperature limitations. No loading is applied to steel columns during the fire test.

The engineer of record shall be consulted whenever fire resistive assemblies with “Load Restricted Factors” are selected. The indicated load reductions are based upon Factored Load effects that are governed by the reduced Factored Resistance of the structural elements. The selection of structural elements is, at times, based upon service limits such as deflection and vibration. These factors and others, such as the change in material strength properties as a function of temperature, should be considered when selecting fire resistive assemblies with Load Restricted ratings.

Unless stated in a design, it is recommended the Load Restricted Factors in Table 1 be used. Designs published in the Fire Resistance Directory that are also intended for use in Canada include the following statement, “Load Restricted for Canadian Applications – See Guide BXUV7”.

Assemblies developed from tests where the load applied on the sample was based upon calculations in accordance with the limit states design method are identified in the Fire Resistance Directory.

ATTACHMENT C

REQUEST for LOAD RESTRICTED RATINGS

Please provide the following information for those assemblies for which it is desired to have UL/ULC staff review the loading calculations. The purpose of the review is to determine the specific impact the requirements of the third edition of CAN/ULC-S101 has on ratings for which the loads applied to the test sample was calculated in accordance with the working stress design method.

Your UL file number or company name:_____

Design Number	Test Report File Number	Test Report Date

NOTE : THE COST TO COMPLETE A TYPICAL LOADING CALCULATION FOR A TEST SAMPLE WILL BE $2, 000.00 US*.

(* For some assemblies proprietary structural members the typical cost may not be applicable and you would be advised upon receipt of your request.)

The form and calculations should be addressed to the attention of Ms. Monica Keeler at UL's Northbrook Office or Ms. Sandy Leva at ULC's office in Toronto.

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